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RESEARCH ARTICLE

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Impact Fees and Real Estate Prices: Evidence from 35 Chinese Cities

Abstract Local governments often charge developers impact fees to finance local public goods. This has been practiced in Chinese cities for more than two decades; however, no empirical studies have tested the effect of impact fees on real estate prices. Using a panel data set for 35 large- and medium-sized cities from 1998 to 2008, we find that impact fees lead to a significant increase in real estate prices. For a given city, an increase in impact fees by one yuan leads to an increase of about 5 yuan in the price of newly-built housing; a 1% increase in impact fees leads to an increase of 5 percentage points in the housing price index and 7 percentage points in the land price index.

Keywords impact fee, real estate price, local public finance
JEL Classification H71, R30, R31

1 Introduction

Real estate developers often have to bear part of the costs of providing urban infrastructure or urban public services when obtaining development permits from a local government. Developers can directly build infrastructure such as roads, sewers, and parks, or pay cash to the local government. This payment by a developer, whether monetary or in-kind, is called a development fee or an impact

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fee in the US; in China, it is called the "urban infrastructure construction fee."

Theoretical and empirical studies on the effects of impact fees on real estate prices are scarce in the literature. This paper is the first attempt to use Chinese city level data to test the effects of impact fees on urban real estate markets. Specifically, we use impact fee and real estate price data from 35 large- and medium-sized cities in China from 1998 to 2008 and quantify the effects of impact fees on the prices of newly-built housing and the prices of newly-transferred urban land use rights (land price in abbreviation). We find that a one yuan increase in impact fees increases the price of newly-built housing by about 5 yuan. Impact fees also increase land prices, which is not consistent with the prediction of existing theories (Yinger, 1998). Our findings suggest that urban infrastructure or public services financed by impact fee revenues may have been capitalized into real estate prices.

Our study provides a new angle for understanding why urban real estate prices have been increasing rapidly during the past two decades in China. Although many arguments have been proposed, such as urban economic openness, real estate speculation, increasing land prices, and developers' marketing strategies, data-based empirical studies are quite few (Ren et al., 2012; Wang et al., 2011; Wu et al., 2012). Our study provides new empirical evidence showing that impact fees are an important factor driving real estate prices. Our findings also have policy implications on the ongoing debate about whether and how property taxation should be implemented in Chinese cities. If revenues from property taxation can replace impact fees, real estate price growth is expected to slow down.

The next section describes the history of impact fees in China. Section 3 reviews both the theoretical and empirical studies on the effect of impact fees on real estate markets. Section 4 introduces the data. Section 5 sets up the econometric models and presents the empirical results. Section 6 concludes.

2 The Evolution of Impact Fees in Chinese Cities

Impact fees in China can be dated back to the early stage of development of the real estate industry in Chinese cities. Wang (1992) is probably the first to examine the phenomenon of in-kind exactions that city governments levy on developers. His field survey of Shenzhen, Guangzhou, and Shanghai shows that local governments have difficulty in financing infrastructure and therefore require developers to provide some "in-kind land rents" (*shiwu dizu*), including roads, public facilities, or even public housing.[1] He also finds that in-kind land

[1] In the early 1990s, there was no urban land market in Chinese cities. Almost all urban land was used for free although some cities began experimenting to charge land use fees or land use right transfer prices.

rents significantly increase the prices of newly-built housing. For example, in 1992 in Shanghai, the average construction cost per square meter of floor area was 600 yuan; the sale price was between 1,100–2,500 yuan. After the normal profits are deducted from the price-cost gap, the rest can be considered to be in-kind land rents. He concludes that such in-kind land rents are essentially land development exactions imposed by local governments because local governments lack stable, sufficient sources of funding to finance urban infrastructure.

During the late 1990s, many cities gradually transformed in-kind land rents to monetary payments. Specifically, many cities directly charge developers "urban infrastructure construction fees" (these are referred to as "impact fees" in this paper). Many cities, such as Tianjin uand Dalian, state clearly that the purpose of charging impact fees is to help finance urban infrastructure. Furthermore, some cities, notably, Chongqing, Guangzhou, and Kunming, require developers to provide some amount of public housing, generally 10%–15% of the total floor area of a development project. This can be considered a social exaction based on the corporate social responsibility of the developer (Fu, 2009).

The amount of fees varies substantially across cities and across building types. In 1996, the Tianjin government charged 165 yuan per square meter of floor area for ordinary housing development projects, and 205–265 yuan per square meter of floor area for high-quality apartments and office buildings. In 2002, the Beijing government charged 160 yuan per square meter of floor area for housing projects, and 200 yuan for non-housing projects in suburban areas; the Qingdao government charged 255 yuan uniformly.[2]

Coincidentally, the urban infrastructure construction fee in Chinese cities is very similar to the impact fee in American cities. Since the 1970s population has been growing rapidly in many American cities, and revenues from property taxes are not enough to finance local public goods. Many cities have begun to require that developers provide some urban public services or infrastructure (in-kind exactions) or charge developers development fees or impact fees. Impact fees have generated heated debates among practitioners, the legal community, and government sectors; so unsurprisingly, economists have recently begun to pay attention to these fees (Brueckner, 1997; Burge and Ihlanfeldt, 2009; Gyourko, 1991; Yinger, 1998). Although many case studies and a few empirical studies show that in general impact fees increase real estate prices, the magnitudes vary substantially depending on the sub-market (new homes, secondhand homes, or land), sample size, data quality, and empirical methodology (Evans-Cowley and Lawhon, 2003). To the best of our knowledge, although the impact fee policy has been implemented for more than two decades in China, there is no empirical

[2] Fu (2009) documents in more detail the history of impact fees in Chinese cities.

study available and ours is the first to test empirically how impact fees affect real estate prices in Chinese cities.

3 Literature Review

Theoretical analysis on the effects of impact fees on real estate prices can be grouped into two strands. The first treats an impact fee as a tax imposed on developers; therefore, the standard textbook analytical tools for the incidence of tax are applicable. Intuitively, imposing an impact fee on developers will increase the price of newly-built housing; how much the housing price will increase depends on the price elasticity of demand for new housing, but the increase will be less than the impact fee itself. If the demand for new housing is inelastic, new homebuyers will bear the larger part of the impact fee. Secondhand housing is an imperfect substitute for new housing, and thus the price of secondhand housing will increase because part of the demand for new housing will be shifted to the secondhand housing market. This analytical framework does not take into account land value appreciation generated by the new urban infrastructure financed by impact fee revenues; nor does it consider migration of residents across cities.

The second strand of theory considers the social benefits generated by urban infrastructure financed by impact fee revenues using the general equilibrium approach (Yinger, 1998). Yinger's model shows that if revenues from impact fees were used to finance local public goods, then new house buyers will pay higher prices because the incremental local public goods will be capitalized into new house prices. In general, secondhand housing receives much less benefit from public investment; therefore, secondhand house buyers bear less of the impact fee burden. The new result of his model is that part of the impact fee incidence will be shifted to owners of undeveloped land, depressing the price of undeveloped land.[3] This is very different from the development market where developers are competitive and impact fees can be passed on to house buyers, otherwise developers will exit the market.

How much do impact fees increase real estate prices? A few pieces of empirical evidence are available from the USA. Those studies generally find that impact fees increase new house prices. Singell and Lillydahl (1990) use data from 429 housing transactions from Loveland, a city in Colorado, during the period January 1983 to December 1985 and find that since the imposition of impact fees in July 1984, new house prices have increased by about 5.6%. They argue that developers may have shifted the major part of impact fees to the buyers or have improved the quality of new houses in order to shift the burden of

[3] Using data from 43 Texas cities, Evans-Cowley et al. (2005) provide weak empirical evidence showing that impact fees decrease the value of undeveloped land.

impact fees to the buyers. Secondhand house sale prices have increased by about 10.5%, possibly because sellers of secondhand houses take advantage of housing capital gain. They also find that development permits decrease by about 11%, suggesting that impact fees might decrease the supply of housing.

Mathur et al. (2004) use data from 14,103 new single family house transactions from King County, Washington during the period from 1991 to 2000 and find that imposing a one dollar impact fee increases the price of new housing on average by 1.7 dollars. The increase is 3.6 dollars for high-quality housing but is minor for low-quality housing. Since the increase in housing prices is larger than the impact fee itself, this suggests that social benefits generated by incremental local public services that are financed by impact fee revenues will eventually be capitalized into housing prices. Similarly, using the data from Dade County in Florida, Ihlanfeldt and Shaughnessy (2004) find that during the period from 1986 to 2000 increasing the impact fee by one dollar raises new home prices and secondhand home prices by about 1.6 dollars. In addition, Dresch and Sheffrin (1997) and Baden and Coursey (2002) also test the effects of impact fees on housing prices in other cities but find a very small elasticity; however, their studies fail to account for neighborhood characteristics of housing units.[4]

Impact fees have been implemented in China for more than two decades. Nowadays many Chinese cities charge impact fees. However, no empirical study is available in China to quantify the effect of impact fees on real estate prices. This paper is the first attempt to provide such empirical evidence.

4 Data

Our data come from two sources. The real estate price data are purchased from the China Index Academy, a leading research institute specializing in the real estate industry in China.[5] The data contain quarterly price indexes for newly-built housing and for newly-transferred urban land for 35 large- and medium-sized cities in China since 1998.[6] The original price indexes are chain-based; we transform the data to be fixed-based, using the first quarter of 1998 as the base period. We use the mean of the four quarter indexes of a city in each year as the annual index of that city. For some years, the data for average housing prices at the city level is available; therefore, we can impute the time series of price levels based on the time series of price indexes.

[4] For a survey of the literature on the effects of impact fees on real estate prices, see Evans-Cowley and Lawhon (2003) or visit http://www.impactfees.com.

[5] The China Index Academy's official web site is http://industry.soufun.com.

[6] In China urban land belongs to the state. Local city governments transfer only land use rights to land users for certain years and charge a lump-sum fee. This fee can be considered the present value of land rents over contractual years and is generally called the "land price." For an introduction to urban land markets in China, see Tao et al. (2010).

The authors manually collect the impact fee data, including the timing of implementation, and the fee amounts or fee ratios, from the official web sites of city governments or publicly released government documents. For data not disclosed on web sites and not released in government documents, we contact local government agencies via email or by phone. We finally assemble the impact fee data for the 35 cities in the sample of the real estate price data for the period from 1998 to 2008. There are two missing values in the land price data for Dalian city so we have an unbalanced panel dataset.

In 1998 only 13 cities charge impact fees; in 2008 all cities charge impact fees. Four cities calculate the impact fees they charge as a percentage of total investment. For example, Nanning and Guangzhou respectively charge 1.5% and 5.5% of total investment as impact fees. In addition, Guiyang switches from proportional impact fees to impact fee level in 2008. All other cities charge a fixed fee for each square meter of floor area of a development project. The highest impact fee is 370 yuan per square meter of floor area charged by the Shanghai city government; the mean impact fee of cities that charge per square meter of floor area is 83 yuan per square meter. Because the consumer price index data at the city level is not available in China, to convert nominal terms into real terms, we use the consumer price index at the provincial level to adjust nominal terms. Table 1 presents the summary statistics of key variables in our econometric models.

Table 1 Summary Statistics

Variable	Sample size	Mean	Standard deviation	Minimum	Maximum
Annual housing price index: nominal	385	119.1	21.2	90.1	217.0
Annual housing price index: real	385	102.3	14.0	77.7	167.6
Average housing price: nominal	385	3,294.2	2,032.9	1,252.9	12,905.1
Average housing price: real	385	2,836.7	1,705.0	1,121.9	11,047.8
Annual land price index: nominal	383	125.0	49.2	81.2	692.9
Annual land price index: real	383	107.2	37.7	69.6	535.1
Impact fee dummy	385	0.7	0.4	0	1
Impact fee level: nominal	330	82.7	85.6	0	370
Impact fee level: real	330	69.5	71.4	0	329.6
Consumer price index	385	116.0	8.8	99.6	154.6

Note: The sample size for the annual land price index variables is 383 because Dalian has two missing values. Five cities use proportional impact fees. Therefore the sample size for the impact fee level variables is 330.

5 Model Specification and Empirical Results

To test the effect of impact fees on urban real estate prices, we specify the

following general model:

$$P_{it} = \alpha_i + \beta_1 I_{it} + \beta_2 T_t + \beta_3 C_{it} + \varepsilon_{it}, \quad (1)$$

where P is one of these variables: price index of newly-built housing, price level of newly-built housing, or price index of newly-transferred urban land. I is a dummy variable set to 1 if a city charges an impact fee in a year; in some models we also use the impact fee level. T_t is a dummy for year t and α_i is the city fixed effect for city i. C_{it} is the vector of other city attributes; in some cases, we include the lagged impact fee level. For all models, the standard errors are estimated using the Hubert-White robust standard error estimator and are clustered at the city level.

Our preferred specification is the city fixed-effect model without year dummies. The justification is as follows. First, in many cases we could not add both cities fixed effects and year dummies at the same time because doing so generates serious multicollinear problems.[7] For example, in 2008 all cities charge impact fees so the impact fee dummy coincides with the year dummy for 2008. Second, since real estate markets are local, locational fundamentals should have much stronger effects on real estate prices than do nationwide macroeconomic shocks. In addition, our focus is the impact fee variable and impact fees are set by local governments. In many cities impact fees do not change for a few years once they are set; therefore, impact fee variables can be considered orthogonal to nationwide macroeconomic shocks. Omitting year dummies may reduce the *R*-squared but would not seriously bias the coefficient estimate of the impact fee variable.

Adding the lagged housing (or land) price index is tricky. On the one hand, housing prices exhibit serial correlation characteristics and the lagged housing price is a very good predictor of the current housing price; on the other hand, the lagged housing price captures the effects of all lagged price determinants, making current price determinants of little explanatory power. It is worth noting here that clustering the standard error at the city level can take into account the intra-city correlation of disturbance terms.

We estimate model (1) for the housing price index, the housing price level, and the land price index, respectively. The results are reported in the following subsections.

5.1 Impact Fees and the Housing Price Index

Table 2 reports the effects of imposing impact fees on the price index of newly-built housing. Columns (1)–(3) use the nominal annual housing price

[7] Although we have tried including other city attributes, such as population and income, they generally lead to similar results and contribute very little to the *R*-squared. We believe city fixed effects capture most parts of cross-city variations; therefore, we do not report the results including other variables of city attributes. Our reported results are the upper bound estimates.

index as the dependent variable; columns (4)–(6) use the real annual housing price index as the dependent variable. In five of the six models, the coefficients of the impact fee dummy are positive and statistically significant; this shows that imposing impact fees increases the housing price index. Columns (3) and (6) are city fixed-effect models with lagged housing prices as additional controls. The lagged housing price index absorbs all the effects of past price determinants, making the adjusted *R*-squared extremely high (above 0.95). The coefficient of the impact fee dummy is positive and significant for the nominal housing price model but insignificant for the real housing price model; and this pattern holds true for all other tables in this paper. This specification may be good for forecasting but not helpful in separating the effects of contemporaneous price determinants. In these two specifications, the coefficient of the impact fee dummy is the lowest bound of the estimate, but probably too conservative to be economically meaningful. Therefore, we do not report these results in the other tables in the rest of the paper.

Our preferred specifications are the city fixed-effect models in columns (2) and (5), showing that for a given city its nominal (real) housing price index increases by about 23 (10) percentage points after an impact fee is imposed. We should point out that since we do not include nationwide macroeconomic shocks and other time-varying city attributes such as population and income, the coefficient of the impact fee dummy might be slightly overestimated.

Table 2 Impact Fee Dummy and Housing Price Index

Variable	1	2	3	4	5	6
Impact fee dummy	1.840***	22.967***	3.214***	2.147**	10.393***	0.653
	(1.95)	(11.18)	(5.31)	(2.19)	(5.53)	(1.34)
$(\text{Housing price index})_{t-1}$			1.091***			0.946***
			(66.87)			(91.42)
Year dummy	Yes	No	No	Yes	No	No
City fixed effects	No	Yes	Yes	No	Yes	Yes
Adjusted R^2	0.584	0.350	0.966	0.313	0.454	0.950
Sample size	385	385	350	385	385	350

Note: The dependent variable is the nominal housing price index in columns (1)–(3) and the real housing price index in columns (4)–(6). Numbers in parentheses below the coefficients are *t* statistics. ***, ** and * indicate significance levels of 1%, 5% and 10%, respectively. Standard errors are clustered at the city level.

Table 3 replaces the impact fee dummy with the logarithmic of the impact fee level. Because Guangzhou, Guiyang, Nanning, Shenzhen, and Yinchuan use a proportional impact fee policy, they are dropped in this estimation. Columns (1), (2), (4) and (5) use a contemporaneous impact fee level, while columns (3) and (6) also include a lagged impact fee level to take into account the lag effect. The dependent variable in columns (1)–(3) is the nominal housing price index; it is

the real housing price index in columns (4)–(6). The coefficients of the logarithmic impact fee in columns (1)–(5) are all positive and significant at the 1% level. Our preferred specifications are columns (2) and (5), suggesting that for a given city, if the nominal (real) impact fee increases by 1%, the nominal (real) housing price index will increase by about 5 (2) percentage points. Note that in columns (3) and (6) the coefficients of the lagged impact fee are still positive, significant, and with similar magnitudes to those in columns (2) and (5), providing evidence for the causal effect of impact fees on housing prices.

Table 3 Impact Fee Level and Housing Price Index

Variable	1	2	3	4	5	6
Log ((Impact fee level)$_t$)	1.324*** (5.13)	5.260*** (10.89)	1.424*** (3.55)	0.983*** (3.67)	2.425*** (5.10)	0.170 (0.62)
Log (Impact fee level$_{t-1}$)			4.543*** (6.91)			2.377*** (3.90)
Year dummy	Yes	No	No	Yes	No	No
City fixed effects	No	Yes	Yes	No	Yes	Yes
Adjusted R^2	0.630	0.338	0.394	0.348	0.434	0.501
Sample size	330	330	300	330	330	300

Note: The dependent variable is the nominal housing price index in columns (1)–(3) and the real housing price index in columns (4)–(6). The impact fee levels are nominal in columns (1)–(3) and real in columns (4)–(6). Numbers in parentheses below the coefficients are *t* statistics. ***, ** and * indicate significance levels of 1%, 5% and 10%, respectively. Standard errors are clustered at the city level.

5.2 Impact Fees and the Housing Price Level

Corresponding to Tables 2 and 3, we estimate the models for the housing price level. Table 4 presents the effects of imposing impact fees on the housing price level. Our preferred specifications are the models presented in columns (2) and (4), suggesting that for a given city, after imposing impact fees, the nominal housing price increases by 540 yuan per square meter of floor area and the real

Table 4 Impact Fee Dummy and Housing Price Level

Variable	1	2	3	4
Impact fee dummy	1,120.12*** (5.66)	540.305*** (7.48)	987.35*** (5.57)	360.915*** (4.39)
Year dummy	Yes	No	Yes	No
City fixed effect	No	Yes	No	Yes
Adjusted R^2	0.102	0.901	0.072	0.944
Sample size	385	385	385	385

Note: The dependent variable is the nominal housing price level in columns (1) and (2) and the real housing price level in columns (3) and (4). Numbers in parentheses below the coefficients are *t* statistics. ***, ** and * indicate significance levels of 1%, 5% and 10%, respectively. Standard errors are clustered at the city level.

housing price increases by 361 yuan per square meter of floor area. It is interesting to note that the values of R^2 in the city fixed-effect models are very high (above 0.9), suggesting that even if year-dummies and other time-varying city attributes are added, the explanatory power of the city fixed-effect models would not be improved much.

Table 5 shows that increasing the impact fee by one yuan increases the housing price by more than one yuan. Specifically, in our preferred models presented in columns (2) and (5), for a given city, increasing the nominal impact fee by one yuan leads to an increase of about 4.8 yuan in the nominal housing price; increasing the real impact fee by one yuan leads to an increase of about 2.4 yuan in the real housing price. These results are in line with the findings from the American data and suggest that the social benefits generated by incremental local public goods that are financed by impact fee revenues may have been capitalized into housing prices.

Table 5 Impact Fee Level and Housing Price Level

Variable	1	2	3	4	5	6
$(\text{Impact fee level})_t$	9.244***	4.773***	0.803**	8.389***	2.364***	–0.707
	(9.51)	(6.45)	(2.14)	(9.50)	(3.48)	(–1.49)
$(\text{Impact fee level})_{t-1}$			4.769***			3.407***
			(4.90)			(3.81)
Year dummy	Yes	No	No	Yes	No	No
City fixed effect	No	Yes	Yes	No	Yes	Yes
Adjusted R^2	0.259	0.881	0.889	0.209	0.919	0.925
Sample size	330	330	300	330	330	300

Note: The dependent variable is the nominal housing price level in columns (1)–(3) and the real housing price level in columns (4)–(6). The impact fee level is nominal in columns (1)–(3) and real in columns (4)–(6). Numbers in parentheses below the coefficients are *t* statistics. Superscripts "***", "**" and "*" indicate significance levels of 1%, 5% and 10%, respectively. Standard errors are clustered at the city level.

We also estimate a log-log model by replacing the housing price level and the impact fee level in the models presented in Table 5 by their logarithmic values. The coefficient of the impact fee variable can now be interpreted as elasticity. Table 6 presents the results. Almost all the elasticity coefficients are positive and statistically significant but very small, between 0.03-0.07. Because the housing price is very high compared with the impact fee level, a very small elasticity still means a large economic effect. For example, the 2008 mean housing price of the 35 cities in our sample is 4,223 yuan per square meter. If the impact fee increases from the mean value of 83 yuan to 91.3 yuan (a 10% increase), an elasticity of 0.05 implies that the housing price will increase by 21 yuan, 2.5 times the increase of the impact fee. This result is consistent with what we find in Table 5.

Table 6 Logarithmic Impact Fee Level and Logarithmic Housing Price Level

Variable	1	2	3	4	5	6
Log((Impact fee level)$_t$)	0.071***	0.045***	0.011***	0.072***	0.024***	–0.0003
	(6.42)	(11.45)	(3.40)	(6.35)	(5.06)	(–0.10)
Log((Impact fee level)$_{t-1}$)			0.040***			0.026***
			(7.93)			(4.66)
Year dummy	Yes	No	No	Yes	No	No
City fixed effect	No	Yes	Yes	No	Yes	Yes
Adjusted R^2	0.189	0.900	0.909	0.128	0.941	0.947
Sample size	330	330	300	330	330	300

Note: The dependent variable is the logarithmic nominal housing price level in columns (1)–(3) and the logarithmic real housing price level in columns (4)–(6). The impact fee levels are nominal in columns (1)–(3) and real in columns (4)–(6). Numbers in parentheses below the coefficients are *t* statistics. Superscripts "***", "**" and "*" indicate significance levels of 1%, 5% and 10%, respectively. Standard errors are clustered at the city level.

5.3 Impact Fees and the Land Price Index

We also test the effect of impact fees on the land price index. Table 7 presents the effect of imposing impact fees on the nominal and real land price indexes. In all models the coefficient of the impact fee dummy is positive and statistically significant, showing that the imposition of impact fees leads to an increase in the land price index. Again, our preferred models are the city fixed-effect models. Columns (2) and (4) show that for a given city the imposition of impact fees increases the nominal (real) land price index by about 35 (18) percentage points. This is a very large effect and is different from the prediction of Yinger's model that impact fees depress the price of undeveloped land (Yinger, 1998). The possible interpretation is that a part of the impact fee revenues have been used to finance new urban public goods. The social benefits from those incremental urban public goods have been capitalized into real estate prices. Since local governments monopolize the transfer of land use rights, the expectation of real estate appreciation due to improved or incremental local public goods will also be reflected by the prices of newly-transferred land.

Table 7 Impact Fee Dummy and Land Price Index

Variable	1	2	3	4
Impact fee dummy	2.887*	34.661***	2.997*	17.802***
	(1.65)	(4.27)	(1.74)	(2.80)
Year dummy	Yes	No	Yes	No
City fixed effects	No	Yes	No	Yes
Adjusted R^2	0.220	0.331	0.121	0.376
Sample size	383	383	383	383

Note: The dependent variable is the nominal land price index in columns (1) and (2) and the real land price index in columns (3) and (4). Numbers in parentheses below the coefficients are *t* statistics. Superscripts "***", "**" and "*" indicate significance levels of 1%, 5% and 10%, respectively. Standard errors are clustered at the city level.

Table 8 presents the results by replacing the impact fee dummy in the models presented in Table 7 with the logarithmic of the impact fee level. The city fixed-effect models (columns (2) and (5)) show that for a given city, a 1% increase in the nominal (real) impact fee leads to an increase of about 7.2 (4.1) percentage points in the nominal (real) land price index.

Table 8 Impact Fee Level and Land Price Index

Variable	1	2	3	4	5	6
Log((Impact fee level)$_t$)	0.895**	7.188***	1.173	0.641	4.053***	–0.100
	(1.99)	(4.15)	(0.88)	(1.22)	(2.75)	(–0.08)
Log((Impact fee level)$_{t-1}$)			6.873**			4.388*
			(2.44)			(1.80)
Year dummy	Yes	No	No	Yes	No	No
City fixed effects	No	Yes	Yes	No	Yes	Yes
Adjusted R^2	0.234	0.315	0.353	0.136	0.358	0.399
Sample size	328	328	298	328	328	298

Note: The dependent variable is the nominal land price index in columns (1)–(3) and the real land price index in columns (4)–(6). The impact fee level is nominal in columns (1)–(3) and real in columns (4)–(6). Numbers in parentheses below the coefficients are *t* statistics. ***, ** and * indicate significance levels of 1%, 5% and 10%, respectively. Standard errors are clustered at the city level.

6 Conclusion

The impact fee policy has been practiced for more than two decades in many Chinese cities. However, no empirical studies have quantified the effect of impact fees on real estate prices in urban China. Using a panel data set for 35 large and medium sized cities from 1998 to 2008, we find that impact fees lead to a significant increase in real estate prices. For a given city, an increase in the impact fee by one yuan leads to an increase of about 5 yuan in the price of newly-built housing; a 1% increase in the impact fee level leads to an increase of 5–7 percentage points in the housing price index and the land price index. Our results suggest that the impact fee is one of many important factors that have contributed to the rapid increase in urban real estate prices in China during the past few decades.

Our findings have policy implications for local city governments. Property tax revenues are a very important source of funding for financing local public services in American cities. Chinese cities do not levy property taxes but levy impact fees to finance local public goods. Some Chinese cities, such as Chongqing and Shanghai, are moving in the direction of implementing property taxation. If property taxation is implemented and the revenues are used to finance local public goods, then, impact fees can be reduced or even removed. This will slow down the fast growth of real estate prices in Chinese cities.

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